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Pharmaceutical Technology	المادة باللغة الانجليزية
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الثالثة	المرحلة الدراسية
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Formulation of Suppositories	عنوان المحاضرة باللغة الانجليزية
تصنيع التحاميل	عنوان المحاضرة باللغة العربية
15	رقم المحاضرة
Pharmaceutical Dosage forms and Drug Delivery Systems By Haward A. Ansel; latest edition.	المصادر والمراجع
Sprowel's American Pharmacy.	

محتوى المحاضرة

Pre-formulation Stage

1. Properties of the Suppository Base

- For fatty bases: record melting temperature and rheological properties of molten base.
 - Drugs miscible with base lower melting point → lower viscosity.
 - If viscosity at 37 °C is low, add hardening agents (e.g., beeswax, cetyl esters wax).
- Larger volume may provoke rectal wall reaction → helps spread molten base over wider area.
 - Example: larger volume of paracetamol suppositories → faster, more complete absorption.
- For water-soluble bases: establish water solubility and dissolution extent in rectal fluid.

2. Drug Properties

A. Drug solubility in rectal fluid

- Determines max attainable concentration → driving force for absorption.
- Small volume of rectal fluid prevents dissolution of highly lipophilic drugs.
- Example: tamoxifen (BCS class II) shows reduced oral availability (~10%) after rectal dosing due to incomplete dissolution.

B. Drug permeation ability

- Must have some lipid solubility to diffuse across rectal membrane.
- Rectum unsuitable for very hydrophilic compounds (cannot cross lipophilic membrane effectively).
- For BCS class III drugs (high solubility/low permeability): add permeation enhancers.

C. Drug solubility in the vehicle

- Determines whether suppository is solution or suspension type.
- High vehicle–water partition coefficient → drug stays dissolved in vehicle → slow release → poor absorption.
- Balance between solubility in vehicle vs. release into rectal fluid must be optimized.

Rules:

- Fatty bases → better for hydrophilic drugs.
- Water-soluble bases → better for lipophilic drugs.
- If drug is poorly soluble in both fat and water → micronize drug to enhance dissolution.

D. Drug particle size

- Important in suspension suppositories.
- Incorporate drug as fine (125–180 μm) or very fine ($\leq 125 \mu\text{m}$) powder.

- Smaller size → faster dissolution. Ideal range = 50–100 μm .
- Particle density should be 1.2–1.4 g/cm^3 for good spreading.
- High particle count increases risk of agglomeration.

E. Displacement value (DV)

- Mass of drug that displaces 1 g of base.
 - Used to calculate required amount of base in formulation.
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3. Additives

A. Viscosity-increasing (hardening) agents

- Needed when:
 - Drug lowers melting point of base (lowers viscosity).
 - Increase viscosity without affecting melting temp.
- Examples: beeswax, HPMC, PVP.
- Create gel-like system → higher viscosity → slower drug diffusion/release.

B. Deagglomerators

- Prevent drug particle agglomeration in suspension suppositories.
- Examples: lecithin, surfactants (prevent caking, improve dispersion).

C. Drug solubility enhancers

- Improve dissolution of lipophilic drugs in rectal fluid.
- Buffering agents → adjust pH → ionize weak acids/bases.
- Nonionic surfactants (e.g., poloxamers) → wetting agents.
- But high surfactant concentration may retard release.

D. Absorption (permeation) enhancers

- Examples: fatty acids, surfactants, bile salts.

- Mechanisms vary; enhance rectal absorption.

E. Antimicrobial preservatives

- Needed in water-soluble base formulations to prevent microbial growth.
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Other Rectal Preparations

1. Enemas

- Liquid preps (solutions, emulsions, foams, suspensions).
- Advantage: no melting/dissolution needed before drug release.
- Packaged in single-dose containers with nozzle/applicator.

Uses:

- Systemic: e.g., diazepam rectal tubes (epileptic convulsions).
- Local: evacuate, cleanse, treat GI tract (e.g., mesalazine foam/enema).
- Diagnostic: e.g., barium enema.

Formulation: oily vehicle (e.g., arachis oil) or active(s) in water, glycerol, PEG, or other solvents.

2. Semisolid Rectal Preparations

- Ointments, creams, gels.
- Often single-dose with applicator.
- Used for symptomatic relief of hemorrhoids and anal fissures.

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